Chapter 9 - Soils and Hydroponics Management

- **Soil**
  - The top layer of the Earth’s surface, suitable for plant life
  - The main medium for plant growth

- **Other media that support plant growth**
  - Leaf mold (partially decomposed plant leaves)
  - Compost (decayed organic matter)
  - Sphagnum or peat moss
  - Rotted wood
  - Manure and straw
  - Perlite (volcanic glass with water-holding properties)
  - Vermiculite (mineral matter used to start plant seeds and cuttings)

**PEI’s Parent Soil Formation**

- Soils are smaller particles of “parent materials” such as rocks. The weathering of rocks can be caused by:
  - Glaciers (ice moving over land)
  - Temperature Changes (cause cracks and breaks in the rock – freezing/thawing)
  - Moving Water (erosion)
  - Plant Roots

- It is important to conserve the soil as it takes hundreds of years to replace it. One way to help is to prevent soil erosion.

**Characteristics of Soil Horizons**

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Name</th>
<th>Colors</th>
<th>Structure</th>
<th>Processes Occurring</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Organic</td>
<td>Black, dark brown</td>
<td>Loose, crumbly, well broken up</td>
<td>Decomposition</td>
</tr>
<tr>
<td>A</td>
<td>Topsoil</td>
<td>Dark brown to yellow</td>
<td>Generally loose, well broken up</td>
<td>Zone of leaching</td>
</tr>
<tr>
<td>B</td>
<td>Subsoil</td>
<td>Brown, red, yellow, or grey</td>
<td>Generally larger chunks, may be dense or crumbly, can be cement-like</td>
<td>Zone of accumulation</td>
</tr>
<tr>
<td>C</td>
<td>Parent material</td>
<td>Varies</td>
<td>Loose to dense</td>
<td>Weathering</td>
</tr>
</tbody>
</table>
Soil Amendments

- Amendment means to add to or change something

- Soil amendments:
  - Add or change nutrients or the soil pH level

Common Types of Soil Amendments

1. pH
   - The measure of acidity or alkalinity
   - The scale is 0-14
   - 0 is maximum acidity
   - 14 is maximum alkalinity
   - Plants grow best between the pH of 5.0-7.5

2. Lime
   - Usually added to raise the pH of the soil (make more basic or alkaline)
   - A pH test is usually done first to determine the amount of lime required

3. Nutrients
   - Primary nutrients are nitrogen (N), phosphorus (P), and potassium (K)
   - Commercial fertilizers will normally have a grade on the bag (10-10-10 or 5-5-5)

4. Organic Fertilizers
   - Include animal waste and compost
   - Contain mostly nitrogen
   - Slow acting as nutrients as they only release them as they decay
   - Are not balanced sources of plant nutrients
Hydroponics

- **Hydroponics**: Growing plants without soil

- Some major systems include:
  - Aggregate Culture
    - Sand, gravel, or marbles support the plant roots
  - Water Culture, solution culture or nutriculture
    - Plant roots are immersed in water containing dissolved nutrients
  - Aeroponics
    - Plant roots hang in the air and are misted regularly with a nutrient solution
  - Continuous flow system
    - Nutrient solution flows constantly over the plant roots.
    - One most commonly used for commercial production.